

**DOCUMENT CONSOLIDATOR AND DISTRIBUTOR FOR EFFICIENT  
MESSAGE PRODUCTION**

**Technical Field**

5           The present invention relates to a system and method for optimizing efficiency in mail and message production equipment and systems. Such equipment and systems may include high volume printers, inserter machines, mail sorting machines, electronic presentment systems, and the like.

**Background**

10           Systems for mass producing mail pieces are well known in the art. Such systems are typically used by organizations such as banks, insurance companies and utility companies for producing a large volume of specific mailings like billing statements, or promotional offers.

          In many respects the typical inserter system resembles a manufacturing  
15   assembly line. Sheets and other raw materials (other sheets, enclosures, and envelopes) enter the inserter system as inputs. Modules or workstations in the inserter system work cooperatively to process the sheets into a finished mail piece. The exact configuration of each inserter system depends upon the needs of each particular customer or installation.

20           Typically, inserter systems prepare mail pieces by gathering collations of documents on a conveyor. The collations are then transported on the conveyor to

an insertion station where they are automatically stuffed into envelopes. After being stuffed with the collations, the envelopes are removed from the insertion station for further processing. Such further processing may include automated closing and sealing the envelope flap, weighing the envelope, applying postage to  
5 the envelope, and finally sorting and stacking the envelopes.

Each collation of documents processed by the inserter system typically includes a control document having coded control marks printed thereon. Scanners are located throughout the inserter system to sense documents and to allow control for processing of a particular mail piece. The coded marks may be  
10 bar codes, UPC code, or the like.

The inserter system control system is coupled to the inserter system's modular components. The control system stores data files identifying how individual mail pieces should be processed. These data files are typically linked to individual mail pieces by the coded marks included on the control documents. As  
15 a collation passes through the inserter system, the coded marks on the control document are scanned and the control system directs the modular components to assemble the mail piece as appropriate.

In preparing mailpieces for mass production, cost savings opportunities are important considerations. One such opportunity arises from discounts offered by  
20 the United States Postal Service (USPS) for pre-sorting sufficient quantities of mail

by zip-code. Pre-sort equipment is available that will sort mail pieces into bins in order to meet the criteria needed to qualify for the discounts.

Another approach to achieving discounts occurs prior to printing of the documents. Using known software, the mail piece print data can be organized so  
5 that mail piece documents are printed in a sequence that is substantially in conformance with the discount criteria. Thus, additional mechanical sorting can be minimized.

Another technique for cost savings is called "householding." Mailers may determine that more than one customer has the same mailing address. In order to  
10 save postage and processing costs, the mailer may choose to combine communications to different customers into one envelope, provided that the different customers have the same mailing address. Thus, if householding is desired, in the pre-print processing of document data, documents for the same-address customers can be flagged as belonging to the same mail piece, and  
15 adjustments are made so that the documents are all processed together and included in the same envelope.

### **Summary of the Invention**

The present invention provides further enhancements for efficiency and cost savings in mass production of mail pieces. In accordance with a preferred embodiment, the invention comprises a message processing system for preparing

a large quantity of messages to be distributed to recipients. The message processing system includes two major components.

The first major component is a consolidator module. The consolidator module receives data corresponding to the plurality of messages to be processed. The consolidator module is programmed to select individual messages to be consolidated into a single message package based on predetermined criteria. Exemplary consolidation criteria may include messages to be delivered to the same mailing address, messages having proximal due dates, messages for which the sender and recipient have authorized consolidation, messages for which marketing content is compatible, and messages for which business considerations are compatible.

The second major component, the distributor module, is coupled to the consolidator module and receives a data stream containing consolidated message packages. The distributor module is programmed to determine optimal routing for production of message packages based on further criteria. Exemplary distributor criteria may include customer preferences for physical or electronic document delivery, capabilities of message production sites, marketing rules, and sender distribution rules.

Together, the consolidator distributor combination can serve to optimize various message production goals. Exemplary goals may include minimizing delivery time of messages, maximizing overall throughput, and minimizing

materials and postage costs. Such goals may also serve as further criteria for controlling the operation of the consolidator and distributor components.

Further details are provided in the accompanying detailed description, figures and claims.

### **Summary of the Figures**

Figure 1 is an exemplary system diagram for an architecture using the present invention.

5        Figure 2 depicts exemplary steps for implementing message consolidation.

Figure 3 depicts exemplary steps for implementing message package distribution in accordance with the present invention.

### **Detailed Description**

One problem addressed by the present invention is reducing the amount of redundant messages or message content intended for a recipient from a sender. At the same time, the invention may provide increased message value by optimizing distribution through selection of the most appropriate distribution channels. By reducing redundant message content and by reducing the overall number of messages produced, substantial savings may be realized.

In a first embodiment, consolidator-distributor 1 is composed of a pair of system engines that consume a set of rules as inputs, providing the means to

rebuild message packages and route them as outputs. The engines collaborate together as an integrated decision-support enabler, designed for accuracy and optimization of automated processes.

The consolidator engine **11** is responsible for re-architecting a set of messages or message packages into a more efficient message or message package based upon a set of rules. In some embodiments, the rules may center around aggregating documents of common format together into a single document (consolidation) or composing a document package comprised of multiple documents intended for the same address in the form of a mailpiece (householding).

Referring to Fig. 1, the consolidator **11** portion of the consolidator-distributor **1** consolidates sets of business documents into a single document or document package by looking ahead in time and collecting a set of documents that qualify for consolidation. Criteria for consolidation may include (a) end user format preferences and pre-authorization, (b) sender preferences, (c) marketing campaign offers, and (d) due date cycle projections. The consolidator **11** may consolidate statements for several different accounts for the same destination address into a single statement or mail-piece.

The distributor **12** is responsible for applying a set of rules for determining the destination route and format of message outputs. As an example, the destination routes for a message or document might consist of a combination of

production mail sites, electronic subsystems (including the Web), or a combination of both. The distributor engine 12 evaluates statement production requirements, contractual requirements, and delivery channel preferences to determine the routing of the statement data to an appropriate site for processing and induction into the mail stream (or electronic presentment). The distributor 12 is responsible for optimizing routing and format conversion of the document based on data available at the time of message generation.

Recipient preferences may indicate whether the recipient prefers hard-copy or electronic delivery. It is also expected that sender preferences will be biased towards minimizing time-in-transit, maximizing overall throughput, and/or minimizing materials and postage consumption. By working together the consolidator 11 and distributor 12 can optimize for the rules and preferences of both the sender and recipient.

Consolidator-distributor 1 may be used as an enterprise-messaging solution responsible for the aggregation and dissemination of intra-business, business to consumer, and business-to-business message packages originating within an enterprise. A "message package" is a package of content originating from a sender, intended for one or more recipients. A message package can have multiple layers of content, auxiliary content in the form of attachments, and multiple destinations. One example of a message package is a flat or folded mailpiece. Another example is an email message.

The consolidator-distributor **1** offers an enhanced messaging process as an adjunct to a closed loop message process. Accordingly, the present invention may be used advantageously in connection with a document production management and control system such as the one described in co-pending patent application 10/280,339, titled, DOCUMENT LIFECYCLE TRACKING SYSTEM AND METHOD FOR USE WITH A DOCUMENT PRODUCTION PROCESS ,dated October 25, 2002. This co-pending application is hereby expressly incorporated by reference.

In order to understand the functionality of the Consolidator-Distributor, the environment that it supports should be considered. An exemplary environment for the present invention is depicted in Fig. 1.

The systems architecture that describes the consolidator-distributor **1** includes the set of logical components responsible for creating, producing, enhancing, tracking, and managing an integrated, closed loop, message cycle. At the highest level the interacting processes consist of the Customer Relationship Management (CRM) **3** processes, the Automated Document Factory (ADF) **4** and Digital Document Delivery **6** processes, the Statement Applications Processing systems **5**.

Consolidator-distributor **1** takes advantage of evaluating historical performance analytics (USPS, email, return mail, cash flows) to assist senders in

reducing production costs, eliminating waste and increasing quality. At the same time, the consolidator-distributor **1** makes the message more attractive.

In a preferred embodiment, the application of the consolidator-distributor may be suitable for periodic statement processing applications where iterative  
5 statement cycles can be improved and optimized over time. Direct mail applications could benefit as well by realizing the benefits of enhanced channel distribution for getting the message out.

Advantages that may be gained by the combination of the consolidator **11** and/or distributor **12** are as follows: minimizing production costs through  
10 consolidation (less paper, less inserts, less machine time, less operator time, less overall waste); minimizing USPS postage costs and maximizing efficiencies; maximizing end-customer satisfaction by adhering to preferences for message packaging; application of campaign offers and marketing messages once per document or document package through consolidation or house-holding;  
15 increasing customer satisfaction through elimination of producing redundant, unneeded, or unwanted messages; increasing customer satisfaction through the elimination of wasted time in consuming unwanted messages, paying bills, or viewing business correspondence for end-customers; increasing capital equipment savings by sharing capabilities of site configurations Increasing conformance to all  
20 SLA (service level agreement) requirements in an automated fashion; optimization of message routing, taking into account reduced time in transit, customer priority,

and message value; automation of site selection based upon production capabilities; maximizing flexibility in responding to machine failures or disasters through automated message re-routing to alternate sites; maximizing end-customer satisfaction by adhering to channel preferences for message delivery; 5 increasing adoption of e-delivery through seamless integration of processes and fulfillment of customer preferences; and enhancing quality control through applied metrics processes (6-sigma, ISO, etc).

A significant system that may be used in conjunction with the present invention is a customer relationship management system (CRM) 3. The purpose 10 of CRM 3 is to assist in building customer relationships. Customer information acquired from sales, marketing, customer service, and support is captured and stored in a database. The system may provide data-mining facilities that support an opportunity management system. It may also be integrated with other systems such as statement applications processing 5 and an automated data factory (ADF) 15 4 for an enterprise-wide system.

A first component of CRM 3 is call center operations 31. Call center 31 is an important point of contact for a business to communicate with its customers 2, and may serve a number of different purposes. Call center 31 may be a point of contact for customers 2 to respond to a marketing campaign. In such case, 20 customer marketing information is provided to the marketing campaign management system 32. Marketing campaign management system 32 may also

be used to determine billboard messages to be included in final document template for communications. A customer **2** may also use the call center **31** to register for certain services and to express preferences in connection for future communications. Such preferences may be provided from the call center **31** to a  
5 customer preferences repository **36**. Customer preferences **36** may include end user authorizations for consolidation of communications. Such preferences are provided to consolidator engine **11**. Customer references **36** may also include distribution channel preferences to be provided to the distributor engine **12**. Customer enrollment data **37** may also be captured and stored by other processes  
10 such as through mail communication, or the Internet. Customer enrollment data **37** may include name, address, and other customer information.

The marketing campaign management system **32** includes tools for analysis, planning, implementation, and control of programs designed to create, build, and maintain mutually beneficial exchanges with customers **2**. Marketing  
15 campaign management system **32** may be coupled to marketing automation tools **33** and determines marketing business rules **35**. An exemplary marketing business rule **35** may determine failover rules if a preferred method of distribution is not available. For example, if a color mail production site **43** was not available, a marketing rule might designate whether a non-color substitute was acceptable.  
20 Distribution related marketing rules are provided to the distributor **12**, while consolidation related marketing rules are provided to the consolidator **11**.

Marketing automation tools **33** allow marketing executives to take advantage of current data to assist in determining marketing messages to be included as part of document composition **34**.

With input from its various components CRM **3** determines the look, feel,  
5 and marketing content to be included on a communication document. When document composition **34** is complete, the document information is submitted to the consolidator-distributor module **1**. Such document information is typically a form, or a virtual document template.

For the business content of a communication, the consolidator-distributor  
10 module **1** receives information from a statement applications processing module **5**. Statements might typically include billing statements to be sent to customers. Statement applications processing **5** may include billing data **52**, static input data **53**, or other message data **54** (such as non-marketing based offers) that would typically be provided to the consolidator engine **11** of the consolidator-distributor  
15 module **1**. Billing data **52** typically includes periodic accounting data, cycle information, due dates, and balances. Static input data **53** may include site capabilities, machine capabilities, and site territorial coverage, based on information received from ADF **4**.

This module **5** may also provide USPS metrics **56** and SLA and quality  
20 metrics **55** to the distributor engine **12**. USPS metrics **56** may include statistics on delivery times between different locations in the service area. SLA and quality

metrics **55** may include particular requirements identified as part of a service level agreement in order to provide satisfactory quality and reliability for a particular job. Finally, the statement application processing **5** generates and stores rules **51** identifying requirements of the biller for composition and delivery of the communication documents. Rules **51** include consolidation eligibility and rules about combinations of different communications to be provided to consolidator **11**. Biller rules **51** may also include rules for minimizing costs, or optimization rules to be provided to the distributor **12**.

As seen in Fig. 1, the consolidator-distributor **1** receives the information for the content of the communications from CRM **3** and statement processing module **5**. The manner of production of the communication is handled by the consolidator-distributor **1**, as will be discussed further below. The delivery and production of the documents is handled by an automated document factor (ADF) **4**. Alternatively, or concurrently, the communication may be transmitted via a digital message delivery system **6**.

Within the ADF **4**, a network **41** controls communication between the devices for creating mail pieces. Network **41** also receives print stream data from the distributor **12**. Network **41** also preferably provides real time production data, machine status, production analytics, site status, and capacity information gathered from production sites **43-45**.

ADF 4 may include mail production equipment at different sites and having different capabilities. For example, site 43 may be equipped to handle color documents, site 44 may be equipped with high-speed, high volume equipment, such as a Pitney Bowes APS<sup>tm</sup> inserter machine, and site 45 may have less expensive lower-speed, lower volume equipment. An enterprise return mail station 46 monitors incoming mail. Such a return mail station 46 may typically associate incoming mail communications with a particular outgoing communication that was previously sent. The mail production machine status and capabilities 42 are stored and provided to the ADF network 41, so that the most up-to-date information is available for deciding which site to utilize for a given mail production job.

If documents are to be presented electronically, information is transmitted via a network 61, such as the Internet, or an intranet. Preferably, such information is transmitted in an HTTP format to a variety of devices 63-67. The various devices 63-67 may receive communications in different electronic formats. For example, an e-delivery message may be sent in HTML format, an email communication may be sent via FTP or SMTP format, a message may be sent in XML format, a statement may be presented on a web services web site, or a bill may be presented on a portable wireless device. Customer preference updates 62 may further be transmitted back through network 61 to the consolidator-distributor module 1.

A global historical reporting system **7** receives data for tracking communications as they are processed through the various components described above. Reports may be generated detailing processing of a particular document, or the operation of a particular machine, or system. Historical metrics are provided  
5 from reporting system **7** to the consolidator-distributor **1**. Audit data is provided from the consolidator-distributor **1** to the historical reporting system. Historical data is also collected from ADF **4**, including mail piece tracking information from the return mail station **46**, and from digital message delivery system **6**.

An exemplary flow-diagram of the operation of the consolidator engine **11** is  
10 depicted in Fig. 2. In a first exemplary step **101**, the consolidator **11** chooses which business application to run. Typically business applications may be defined along different lines of business. For example, a large bank might have credit card accounts, mortgage accounts, and other financial services for which statements and other communications need to be periodically transmitted. In one embodiment  
15 each line of business might require separate processing. However, in an alternative embodiment, the consolidator **11** may concurrently process accounts for different lines of business in the same application. In a preferred embodiment, the application for processing is selected based on a predetermined schedule, and each application preferably is assigned a unique identification number.

20 In a preferred embodiment, consolidation may involve combining communications for multiple accounts for the same individual. The multiple

accounts may be in the same line of business, or across multiple lines of business. In a further enhanced embodiment, statements for different individuals with the same mailing address may be combined in accordance with householding rules.

5           In step **102**, the appropriate template generated by the document composition tools **34** is selected for the particular application. The consolidator **11** determines the current timing in the transactional cycle, and selects customer accounts pertinent for that cycle (step **103**). In a first embodiment, the consolidator **11** determines potential candidates for consolidation based on the  
10   proximity of due dates. In order to facilitate consolidation, due dates for different transactions may be adjusted in order that the timing of the corresponding transactions not be altered. In a second embodiment, due dates are not adjusted, but candidates for consolidation must have due dates within a predetermined time window. An exemplary time window would be within five days of each other.

15           At step **105**, customer accounts having the same mailing address are identified. Next, the sender and marketing business rules for consolidation are applied to the previously identified statements (step **106**). The business rules for consolidation are determined based on the sender's perceived needs in connection with the particular communication. Certain types of information (such  
20   as health care information) may be determined to be too sensitive, and not appropriate for consolidation. From a marketing perspective, it may be determined

that concurrent presentation of two transactions is more likely to result in an adverse decision by the customer, and therefore also not appropriate for consolidation.

Based on the applied business rules, a determination is made whether the  
5 account is eligible for consolidation of multiple account statements (step **107**). In one embodiment, if the account is not eligible for consolidation, then a determination is made as to whether the account is eligible for householding of statements (step **108**). In this embodiment, it is assumed that consolidation is preferred over householding from the senders perspective. However, this  
10 assumption could be overridden by customer preferences.

If the account is eligible for consolidation, then customer preference data **36** is checked for authorization to consolidate. If authorization is received (step **111**), then customer and account data for all qualifying accounts are applied as a unit to the document template generated from document composition **34** (step  
15 **113**). By consolidating, the sender may achieve significant savings. The document footprint is reduced resulting in reduced production costs and reduced defects. With fewer mailpieces USPS postage costs are reduced. Finally, consolidation can be tailored to maximize customer satisfaction.

At step **116**, the appropriate one-to-one marketing messages are applied to  
20 the documents. For consolidated statements, the message need only be applied once. With all of the document content determined, the document printing and

production data is generated (step 117). For future processing, a document identification number is established for each mail piece. The generated document object is then forwarded to the distributor engine 12.

Returning to the householding alternative at step 108, if the statements are  
5 not eligible for householding, then the document generation step 117 is carried out. If householding is available, customer preference data is checked for authorization to household. If authorization is not found (step 112), then customer and account data for each customer and account is applied separately to the document template to generate separate mail pieces (step 114). In a further  
10 embodiment, when householding or consolidation is not authorized by the customer, then the sender may include a targeted message explaining the benefits of householding and consolidation (step 119). If householding is available, the separate account data is marked as belonging to the same mail piece (step 115).

Once a mail piece is defined in accordance with the consolidator engine 11,  
15 the distributor engine 12 determines the manner of producing and delivering the document. Fig. 3 depicts exemplary steps carried out by the distributor engine 12 for achieving efficiency and delivery goals.

In step 201, document packages created by the consolidator are added to a pool of pending packages for production and distribution. For each document  
20 package in the pool, the distributor 12 determines a preferred distribution channel. Customer preferences 36 identify whether they would like to receive

communications electronically (via digital message delivery **6**), or by mail (typically via an ADF **4**). For each document instance package, the consolidator determines sender's rules **51** and SLA and quality requirements **55** (steps **203** and **204**).

5        Often, minimizing delivery time is an objective for mail communications. Accordingly, in selecting the method of document production, at step **205** the distributor **12** applies USPS time-in-transit tables to determine delivery times to the recipient from various production sites. As such, distributor **12** will use USPS data to determine delivery time from each of the separate local sites **43**, **44**, and **45**.

10        In a further embodiment, distributor **12** considers historical data for similar job types and applications (step **206**). The historical data may include data on processing times, production costs, equipment failures, and frequency of errors in mail production. Depending on the applicable business rules, and goals for a particular instance of packages, different portions of this data may be of interest.

15        A further step **207** carried out by the distributor is to determine if quality improvements can be made in a current mail run job over previous jobs of similar application type. Consolidator **12** also gathers the real time status and machine performance analytics from the local sites **43-45** (step **208**). This real time information supplements the historical information gathered previously. If a site or

20        machine is not operational (step **209**), then an alternative site or distribution channel is identified (step **210**).

Based on the input of information through steps **201-210**, an optimal site routing is determined (step **211**). The various rules and requirements determine the goals, and the statistics and analytics help determine how to best achieve those goals. For example, if minimizing delivery time were a goal, then a site routing with the quickest processing time and delivery time would be selected. If minimizing costs took priority, then the site with the minimum costs could be selected. Similarly, for sensitive documentation, a site with a higher quality record could receive priority for processing a particular job. Preferably, algorithms are applied in order to maximize value to the sender in view of all of the competing constraints and priorities. Where digital message delivery **6** is desired or permitted, it too will be considered as one of the options for delivery of the communication.

When optimal routing is determined, the data streams are composed and formatted accordingly (step **212**). The formatted streams are further sorted to meet contractual requirements or to optimize costs (step **213**). The formatted and sorted streams are then routed to the sites **43-45**, or **6**, for production and delivery (step **214**). After the distributor engine has completed routing of data streams, the global historical reporting system **7** is updated with the new information.

Thus, although the invention has been described with respect to a preferred embodiment thereof, it will be understood by those skilled in the art that the foregoing and various other changes, omissions and deviations in the form and

detail thereof may be made without departing from the scope of this invention, as further described in the following claims.